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Voluntary Pollution Prevention Programs in New Zealand – An evaluation of practice versus design features

Kenneth F.D. Hughey*, Donald G. Chittock [1]

Faculty of Environment, Society and Design, PO Box 84, Lincoln University, Lincoln 7647, Canterbury, New Zealand

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ABSTRACT

Coordinated voluntary approaches to Pollution Prevention are widely practiced in many western-style economies. However, little empirical research has been undertaken into the extent to which these approaches match best practice pollution prevention approaches. In this paper nine programs employed by five regional and district councils in New Zealand are evaluated against nine 'Best Practice' design features. All five councils' pollution prevention programs contained some of the best practice design features in their program's design. Perhaps not surprisingly the older programs rank highest out of the five. However, all programs have the potential to develop towards containing all of the 'best practice' design features, with most emphasis needed on the credibility of program monitoring. From an ongoing research perspective, and also from an overall PP program performance point of view, the biggest challenge remains the extent and depth that the programs apply each of the design features. As presented they are extremely generic. While generic design features provide for flexibility in implementation, often seen as a positive, they can also be a recipe for 'tokenism', something that future researchers and program managers need to be aware of. We also sought to determine if these programs were contributing to sustainable management in New Zealand. Findings in this respect were equivocal. This finding in part is due to the lack of specificity around targets, monitoring and reporting, items needing further attention from managers and researchers.

1. Introduction

Voluntary Pollution Prevention Programs (PPPs) are generally used in the policy mix to support regulation or to explore new policy areas. Substantial evidence suggests the relationship between voluntary approaches and regulation is reciprocal; voluntary approaches provide flexibility and cost effectiveness (Borkey et al., 1999). Best practice design features in a range of these voluntary PPPs were identified in Chittock and Hugheys' (2011) review of systems operating in Australia, Canada, Japan, the United Kingdom, and the United States. They identified nine key 'best practice' features, which in header form are summarised as:

- Adequate and consistent funding
- Collaborative relationship with industry
- Single sector program focus
- Setting credible goals
- Info-regulation and resources available
- Threat of credible enforcement
- Regular and credible monitoring
- Visible participant benefits
- Transparent provision of program results.

But, despite identification of guidelines, or design features, for improving practice there remains limited evidence on the effectiveness of voluntary approaches, or on the uptake of best practice approaches.

In New Zealand the Resource Management Act 1991 (RMA) is considered the cornerstone of the country's legislative approaches to environmental management, including pollution prevention. When the research described in this paper began in 2006 four regional councils (the top tier of local government and responsible for air and water quality amongst a range of other issues) and one city council (the second tier of local government and responsible for land use and the provision of most services including domestic water supply) in New Zealand were known to have initiated voluntary approaches focused on pollution prevention. With the

* Corresponding author. Fax: +64 3 3253845.
E-mail address: ken.hughey@lincoln.ac.nz (K.F.D. Hughey).
[1] Present address: Environment Canterbury, PO Box 345, Christchurch, New Zealand.

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number of publicly funded programs and expenditure, levied through rates, growing there is an increasing need to determine whether these programs are adopting best practice design principles.

In this paper we investigate the extent to which New Zealand councils' voluntary pollution prevention programs are developed in accordance with international 'best practice' design features, are supported by appropriate policy mechanisms and are an effective instrument for improved environmental management.

2. Methods

Comparative to most of the countries reviewed in Chittock and Hughey (2011), voluntary approaches in New Zealand are relatively young. The research reported here is the first known survey or analysis of council pollution prevention programs, although Brown and Stone (2007) do provide useful policy and related context to this evaluation, and Narayanaswamy and Stone (2007) report on business and industry initiatives in Australia and New Zealand, but not from the program perspective reported here.

We employed a mixed methods approach to achieve the three aims of this paper. This approach incorporated:

- reviews of councils' statutory policies and plans, i.e., the first aim of this paper;
- a questionnaire administered to program managers in the five councils. The questionnaire was structured around five key areas: program evolution; type of program; policy and regulation; program structure; and performance measures – it comprised of 18 questions which were a mixture of yes/no and more open-ended questions. These questions, in sum, contributed to evaluation of the design features employed and to program contribution to environmental management objectives, i.e., the second and third aims of the paper. Where insufficient information was provided to enable a judgement to be made we resorted to the informal personal interviews and discussions to elicit appropriate responses; and
- ongoing informal personal interviews and discussions with the personnel of the five councils with pollution prevention programs. These interviews and discussions occurred either over the telephone, by email or via face-to-face discussions at national meetings, and contributed qualitatively to all three aims of the paper.

Four of the councils studied are regional authorities and from the north to the south of New Zealand were:

- Northland Regional Council (NRC), the northern most regional authority, with the longest coastline of all regions,
- Auckland Regional Council (ARC), the most densely populated authority with the country's largest city (Auckland) within its boundary,
- Greater Wellington Regional Council (GWRC), centrally located at the bottom of the North Island, and containing a very diverse mix of land use types,
- Canterbury Regional Council (CRC), the largest council by land area with New Zealand's second largest city (Christchurch) within its boundary, and located in the South Island.

The fifth council, North Shore City Council (NSCC), is a territorial authority and is the fourth largest city in New Zealand, located inside the regional boundary of the Auckland Regional Council.

3. Results

3.1. Evaluation of council policy mechanisms

In New Zealand regional councils and district councils are respectively required to produce a Regional Policy Statement (RPS) or a District Plan (DP), mandated under the Resource Management Act of 1991. One similarity among all RPSs reviewed was mention of education or information provisions based around the improvement of surface water or storm water quality and hazardous substance storage. Table 1 lists the Pollution Prevention relevant features mentioned in the RPSs or district plan.

Cleaner Production is a consistent element mentioned in all four RPSs, alongside specific guidelines and Codes of Practice (CoP(s)) in the development of environmental education strategies for industry. "Cleaner production means applying a strategy to your business to make the most efficient use of resources including raw materials, water, energy, time and money whilst preventing pollution and minimizing your impact on the environment. To maintain their effectiveness, cleaner production strategies are regularly re-evaluated" (Ministry for the Environment).

All four regional councils have documented their commitment in their recent Long Term Council Community Plans (LTCCP), produced under the Local Government Act 2002, to actively include and support voluntary approaches or programs. All the relevant sections of the regional authorities' RPSs reviewed include the use of Cleaner Production principles.

The methods listed in Auckland's RPS (ARPS) (Auckland Regional Council, 1999) are very prescriptive and specifically list practices or physical systems that must be used by industry and sites to meet policy requirements. Methods specifically mention the implementation of an "Industrial and Trade Pollution Program to avoid, remedy, or mitigate the adverse effects of discharges from industrial and trade activities" (Auckland Regional Council, 1999). The other three regional councils' RPSs use a broader supporting methodology for describing their industry education provision. A broader approach in a council document potentially allows for interpretation by council personnel in the implementation and development of a voluntary industry approach. This is where the use of the words 'Industrial and Trade Pollution Program' by ARC leave no doubt as to what should be developed.

The district plan of NSCC provides less information than the RPS documents, but the district plans must give effect to RPS requirements and support them. District Plan functions, amongst others, are to control the use of land and natural and physical resources, to a lesser degree than those of a regional authority RPS. The NSCC District Plan includes the specification of guidelines for the operation and management of hazardous substance facilities. No detail on how to implement or develop this is provided; this lack of detail is comparable to the majority of the RPSs' reviewed.

3.2. New Zealand Councils' Voluntary Pollution Prevention Programs

A questionnaire was distributed at a national meeting of council program managers, an email version was also sent to all personnel involved following the meeting. A follow-up email was sent one month after questionnaires were distributed along with phone calls to check on progress and answer any questions related to the questionnaire. This occurred over a six-month period. While most councils returned the questionnaires within four weeks, one took six months. Greater Wellington Regional Council was the only council to not return the questionnaire. The relevant material and review of their findings relied on personal discussions with the program leader and their website for research material. Senior

Table 1
Voluntary Approach mechanisms in regional and local environmental policy documents (Empty cells indicate no relevant information was found.) – definitions of 'method' and 'policy' given in column 1 are consistent with the Resource Management Act 1991 – see http://www.qualityplanning.org.nz/definitions/index.php – accessed 12 February 2010.

Policy areas	Northland Regional Council Regional Policy Statement	Auckland Regional Council Regional Policy Statement	Wellington Regional Council Regional Policy Statement	Canterbury Regional Council Regional Policy Statement	North Shore City Council District Plan
Principles (main or leading ideas)	Cleaner production	Cleaner production and education	Cleaner production Anticipatory and flexible approaches are 2 of 13 guiding principles of GWRPS	Cleaner production	
Methods (a specific course of action to implement a policy specified in a plan, and includes rules and other regulatory methods, and non-regulatory actions)	Implementation includes: education, industry based CoP or guidelines, provision of information and environmental standards	Prescriptive and specific CoP, guidelines and education program Industrial and Trade Pollution Program	Where necessary develop standards, guidelines and CoP in co-operation with industry Education and information provision to change behavior	Use of CoP, environmental education, advocacy	Specifying guidelines and best operational practices and promoting excellence in managerial practices
Policies (a general course of action taken by the local authority to achieve an objective)	Policies promote best management practices		The complementary use of voluntary approaches is a stand-alone option for supporting industry	Information provision to change people's perceptions, attitudes and behavior Better management practices	Education program for business in conjunction with ARC
Regulation (imposed by government and given effect through a rule in a plan)		EMP to meet permitted activity status Voluntary EOP is considered to satisfy regulation conditions	Complement to regulation when consent required Balanced approach	Education and information provision alongside regulatory methods	Education in conjunction with rules

program personnel from Greater Wellington Regional Council reviewed this analysis to confirm its accuracy.

Returned questionnaires were evaluated against the 'best practice' design features identified in Chittock and Hughey (2011). The council's pollution prevention program design features were identified as each questionnaire was reviewed. When a design feature was not able to be identified from the questionnaire alternative inquiry mechanisms were used. These included further review of council websites, reports, policy documents and publications before finally contacting program personnel and asking them explicitly about the design feature. The following five sections each deal with an individual case council, with results reported in the following order: a general introduction to the program and its development; progressive comments on each of the nine design features; and, a final comment where appropriate on general contribution of the program to environmental management in the region or district.

3.2.1. Northland Regional Council – Pollution Prevention/Cleaner Production

The Northland Regional Council voluntary program began in 2006. It developed from statements in the RPS (Northland Regional Council, 1999) and Regional Water and Soil Plan (RWSP)(Northland Regional Council, 2004) that mandate waste minimization work with industry, thus leading to the appointment of a Cleaner Production/Pollution Prevention Officer (CP/PPO). The program is classified as a public voluntary program, with a relatively informal approach used in its implementation with industry.

The CP/PP program is fully ratepayer funded, with no direct cost to the site. Business participants welcome the 'free' funding concept, but can find it hard to believe; first, that the council will not initially penalize them for environmental issues found on their sites and, second, for identifying possible areas where they may be able to find efficiencies and reduce costs.

The program is classified as a public voluntary program, with a relatively informal approach used in its implementation with industry. Overall it attempts to be collaborative.

Cleaner Production was the initial focus of the CP/PPO, however their first two sector groups (vehicle washing and auto dismantlers/scrap dealers) had a pure Pollution Prevention (PP) focus (i.e., they had an almost total focus on prevention of water pollution). The third group, boat-building, allowed the use of a broader Cleaner Production (CP) and PP inclusive approach. Due to the scale and nature of the boat-building industry with a full manufacturing process, greater scope for resource efficiencies through CP was possible. Efficiencies were created through optimising processes and developing a continuous improvement culture. The PP/CP program approaches all known sites within an industry group, the program will continue to develop and is flexible in its approach allowing it to adjust to the industry sector worked with to achieve the desired environmental outcomes.

The objective of NRC's program is the promotion of environmental awareness combined with the acceptance and adoption of pollution prevention techniques. Measurement of the program against this objective is empirical in nature with witnessed changes to site practices and behaviour gauging the success of the program.

Program promotion is through direct contact with individual sites or industry groups and information available on NRC's website (www.nrc.govt.nz) and the networking of the CP/PPO. The program also interacts with agencies, such as Enterprise Northland, who promote and encourage sustainable economic development in partnership with central government, local industry, business and local councils. Successful case studies will be written up and used in future to publicize the program further to the business and industry groups, this may help to allay some business fears of working with

a regulatory authority. Behavioural change is a large part of the process with initial points of contact being addressed to business or site management. Their direct involvement depends on the size of the business approached and management's enthusiasm for the program, in some cases responsibility may be designated to operational management level personnel.

The Pollution Prevention Program has enforcement links. These can be utilized within the Regional Council structure for businesses reluctant to comply with recommended PP measures that relate to current regional rules and relevant legislation.

Sites that are slow to respond are followed up on; those that resolve their site issues are thanked with a letter and used as role models for others in the industry.

To date the only potential direct benefits to program participants are the resource efficiencies through the CP component of the program but this has not been applicable to all three industry groups covered. Indirect benefit for a participant occurs through the reduced potential for enforcement action and monetary fines by working co-operatively with the CP/PPO. It has been reported by the NRC CP/PPO that greater success has been had with industrial participants when a pollution prevention perspective is used with more of a potential enforcement focus on environmental issues, as opposed to a CP perspective with an "I can help you save money by reducing waste" focus.

The program is not reported on in council annual reports.

3.2.2. Auckland Regional Council (ARC) – Industrial Pollution Prevention Program

ARC's urban pollution control program began in the mid 1970s. The program then was purely responsive to incidents of pollution reported by the public and other agencies. The first proactive pollution control program of visiting and auditing industrial sites occurred in the mid 1980s in the Manukau Harbour catchment. The proactive auditing component was continued following the implementation of the RMA and undertaken by ARC's Pollution Control Team who developed an urban pollution control system called the 'Industrial Pollution Prevention Program (IP3).

There is no initial cost to a business site for the voluntary program, however if a site has been visited previously and/or significant pollution is found ARC may seek to recover costs if appropriate. Costs can include officer time, mileage, sample analysis fees and any other material expenses.

The IP3 program is designed to work proactively and co-operatively with businesses with a firm-but-fair policy underpinned by statutory enforcement tools. Evolution of the purely voluntary program has changed with the introduction of the Proposed Auckland Regional Plan: Air, Land and Water (Auckland Regional Council, 2005), potentially requiring all moderate and high-risk industrial or trade process sites to have an Environmental Management Plan (EMP). A guide and template provides the basis for sites to create and implement their own EMP.

Over the last decade a number of different types of interventions have been implemented from:

- Targeting industry sectors with high pollution risk
- Working with business communities located near sensitive catchments
- Proactive and voluntary initiatives
  - From guidance in the form of an industry sector letter
  - On-site audits
  - Catchment or sector-based workshops.

The primary objectives of IP3 are to protect and improve land and water quality from industrial and trade activities through targeted pollution audits or assessments to ensure compliance with the RMA by:

- Identifying and stopping any actual pollutant discharges to land and/or water
- Identifying and eliminating, or putting in place site management controls, to address potential discharges, and
- Ensuring industrial site operators are prepared to deal with accidental discharges through the preparation of emergency spill response plans.

Assessments of high-risk industry sectors were compliance based; other lower risk industry groups had proactive visits providing information and discussing pollution prevention opportunities. Education material provided to industrial sites includes the Environmental Operations Plan (EOP) and industry specific fact sheets designed in conjunction with the industry groups.

Sites with identified issues are followed up on to make sure the issues are resolved; sites that require consents are followed up by programmed compliance monitoring visits.

Internal measurements for gauging program success include the number of sites assessed by the Industrial Trade Processes (ITP) team and the number of consents participating sites require and apply for. A key objective of ARC's voluntary program is to identify if resource consent is required. It needs to be noted that the ITP team are also responsible for processing and monitoring consents for the discharge of contaminants onto or into land from industrial or trade processes.

Auckland RC views reduced risk of pollution incidents, associated clean up and enforcement costs as indirect financial benefits to a program participant.

Within the LTCCP (2006–2016) (Auckland Regional Council) one publicized form of measuring the program's success is the annual reduction of repeat pollution incidents from industrial or trade premises.

Overall, there is no long-term measurement of the EOP program's effectiveness with regard to improving environmental performance.

3.2.3. North Shore City Council – Pollution Prevention

Pollution prevention work has been undertaken by North Shore City Council (NSCC) since 2001, the main focus being on issues related to the identification and prevention of surface water pollution to the storm water system. Included in this work is the 'blitz' program which targets industrial, commercial or catchment based areas.

This work is ratepayer funded and generally carried out in the form of selected industrial and commercial area or catchment 'blitzes'.

NSCC staff utilize the "private agreements" type of voluntary approach when working with a site; this is established by 'direct bargaining' over specific issues identified.

The selection of a blitz area is based on historical pollution incidents, location of high-risk businesses and the sensitivity of the receiving environment (e.g., surface water) – the program is multi sector.

There is little in the way of explicit action in terms of setting credible targets.

'Blitzes' aim to "identify sources of actual or potential pollution on-site and ensure that companies and individuals are complying with New Zealand's environmental legislation" (Pollution Prevention). The program focuses on the manager of a site and encourages action to be taken. An initial site visit is made with a follow-up site visit if necessary to ensure compliance.

All sites visited receive a letter thanking them for their participation and covering any issues that were identified during the blitz (Chittock, 2008).

The council uses the media to advise and warn businesses they are planning a 'blitz' and also to provide feedback to the community once the blitz has been completed.

The benefit of NSCC's program to the business is a reduction in risk of an illegal discharge and potential fines.

Public reporting of the program achievements is mentioned in two of the last four annual reports (Pollution Prevention). Like most councils' annual reports, both regional and territorial, only high level project information is reported on.

In August 2007 the NSCC reviewed its proactive pollution prevention programs, including the 'blitz' approach to ascertain the effectiveness of different methods for encouraging behavioural change. The focus groups included industry sites the NSCC pollution prevention team had visited, those they had sent information to and a control group with no solicited council contact. The objectives of this review included determining business attitudes and knowledge of their environmental responsibilities and the assessment of current interactions between businesses and pollution prevention staff and identifying barriers for businesses in implementing pollution prevention measures.

Findings from the focus group evaluation showed that NSCC was sending out too much general information; businesses are only interested in what is directly relevant to them and the implications for their business. The two groups who had contact with pollution prevention staff appeared to have higher levels of awareness about environmentally responsible business behaviour, specifically spill kits, not washing to drains and safe storage and disposal of hazardous wastes. The third group had reasonable awareness levels, particularly those members of a trade association; however most saw the issues as common sense.

The focus groups concluded the future direction of the NSCC program should be to:

- Work further with industry groups and associations,
- Develop a green grading system for rating business compliance,
- Publicize offenders and good performers,
- Provide workshops for businesses in environmentally risky industry sectors.

Subsequent recommendations that came from the focus group research have been included in future planning considerations of NSCC:

- Blitz type programs will continue but will target more high-risk industry sectors, with industry specific information,
- Publicize compliant businesses and make examples of non-compliant, and communicate financial benefits of being compliant (costs of spills, fines)
- Work with other council departments so that a variety of issues are covered when visiting a business, not just pollution prevention (e.g., waste minimization, energy and water consumption and trade waste)
- Have greater follow-up with sites visited to check action is actually done, provide further information or take enforcement action (North Shore City Council, 2007).

3.2.4. Greater Wellington Regional Council (GWRC) – Take Charge

The 'Take Charge' program was established in 2001; the principal objective was to assist businesses to identify and address their environmental problems, and provide the foundations for them to go beyond compliance if they choose. This could be achieved via recycling, cleaner production, management systems and other environmental initiatives.

Funding for the Take Charge program has varied, even though the program is fully ratepayer funded. Budgets have never been fully utilized with three of the seven years reported spending less than 50% of their allocated budget. GWRC is the only council researched to publicly provide individual program budgets in their annual reports.

Environmental Protection Officers (EPOs) implement the 'Take Charge' voluntary program and work collaboratively with sites to implement practical solutions to identified issues and to improve overall environmental performance (Greater Wellington Regional Council).

Take Charge is a generic voluntary program. Initially the approach of the program was to focus on one or two industry groups and approach all the businesses within these industries. The program then changed to include the catchment approach in conjunction with an industry approach, with the catchment approach seemingly used to a greater extent today.

Audits identify actual or potential environmental pollution of a significant nature; however formal steps may be taken to effect an improvement.

This program included information workshops, a guideline, checklists and standard resource consent conditions for council staff, contractors, consultants and developers (Greater Wellington Regional Council).

'Take Charge' uses a 'carrot and stick' approach. This is consistent with the objectives of the Environment Division's Strategic Plan 2002–2010, where divisional priorities for the Environmental Regulations Department include:

- A hard line on compliance, using a fair and reasonable (but no-nonsense) approach and;
- Increased emphasis on pollution prevention (Greater Wellington Regional Council).

In the 2005–2006 year changes were made to site resources for EPOs, this included the implementation of a new 'Take Charge' audit form; this was developed to remove the delay between the site audit and the formal report being delivered to the site. Audit reports can be issued on the spot, giving recipients an instant record of their performance and reminder of actions required. During 2005 revisits were conducted for service stations and motor vehicle workshops where significant issues were identified from previous years (Greater Wellington Regional Council). GWRC personnel have analyzed their program and found that to get committed action by participants to change site practices a minimum of three visits is required.

GWRC are considering introducing a certificate of support or acknowledgement, for participating businesses.

The parameters for measuring the impact of the program are set each year in the annual plan and reported on in the annual report. In the last four years' Pollution Control Annual Reports, the industry groups targeted and the numbers of actual site audits conducted have been recorded. Information on catchment based approaches and why areas are selected are summarized along with other projects undertaken under pollution prevention initiatives. All Annual Environmental Incident Reports and Pollution Control Reports from 1998 onwards are available online (Greater Wellington Regional Council).

Over time the program began to explore more integrated approaches to environmental management. For example, the environmental protection team contributed to an environmental management guideline prepared by Vector, a network utility

operator, for contractors to use when installing power cables and undertaking maintenance. This included proposing pollution control measures and presenting them to Vector's contract managers (Greater Wellington Regional Council). During this same period a guideline for developers and contractors to use when designing and developing subdivisions on steeper sites was published. This activity was causing increased siltation of many watercourses in areas under development pressure in the region.

3.2.5. Canterbury Regional Council (CRC) – Pollution Prevention Guide

In 2002 CRC implemented a voluntary program called the Pollution Prevention Guide (PPG). The PPG is described as; "An Environmental Guide for Business describing appropriate site management of hazardous substances and solid and hazardous waste" (Canterbury Regional Council). In February 2005, following a diesel spill in a local river, the program employed Pollution Prevention Officers (PPO) to promote and implement the PPG to industrial and business sites in Canterbury.

The PPG program is fully ratepayer funded with no costs to sites for staff time or resources provided. It is proposed to run until at least 2016 as stated in the LTCCP (Canterbury Regional Council).

In most cases management, or in smaller businesses the owners, are contacted to discuss participating in the PPG program. Approaches at this level allow ownership to be taken by management and if implementation of the program is passed to relevant staff, the PPOs know that any inaction can be redirected back to management for resolution. A strong collaborative approach is thus being fostered.

The CRC voluntary program approaches and works with individual sites, industry groups and associations to promote and gain access to potential program participants. Referrals from existing sites that already use the program is another method used. Implementing this strategy means that potentially all sites within a sector are contacted, maintaining a level playing field and program credibility. Not all sites approached or worked with in the program hold resource consents. The program is clearly generic.

The PPG is a modular document in the form of a basic environmental management system or plan, designed to improve environmental practices and prevent pollution. It is intended to show a business has documented evidence of its site activities and procedures and reduced the risk of causing harm to the environment.

The PPO provides a written site assessment of the issues with an agreed resolution timeframe for site personnel to work to; this allows measurement of a participant's achievement.

The development of the program from a purely written resource for industry, to having staff to work with sites in its implementation, has seen the PPG develop into a voluntary program.

The PPG program is designed to raise awareness and improve the environmental practices of sites and compliance requirements. If a site implementing the PPG program is found to contravene a CRC rule during a site assessment and the site chooses to not rectify the issue, then enforcement will be notified. Leniency is provided first, the site is made aware of why the activity is an issue and given the opportunity to voluntarily comply and rectify the issue.

Implementation of the program involves at least two site visits, one to introduce and assess the site and at least one follow-up visit to check on implementation progress and issue resolution. All issues found are ranked into categories of risk posed to the environment and risk of breaching rules or regulation.

Follow-up visits are planned after a two-year period to see how the site is performing. Contact with sites is maintained by sending out holiday shutdown procedures to all participants twice a year, along with requests for six-month progress reports from all sites.

Consented sites that return four consecutive six-month reports are entitled to have their compliance monitoring visits reduced; this reduces participating sites' costs as these are paid for by the consent holder. Other benefits include the promotion of program participants through case studies on the CRC website and in local newspapers and CRC publications. Participants required to obtain spill kits from site assessments are entitled to a discount from participating spill material providers.

The stated objective of the PPG program is; "Providing advice on preventing pollution from industrial and commercial sites, to protect the environment." The PPG program is measured on; "the number of business sites that receive a site assessment and guidance on pollution prevention each year" (Canterbury Regional Council). In the first two years neither target has been met due to staff recruitment taking longer than expected, and the higher than anticipated number of issues found on sites visited (Canterbury Regional Council).

Future plans for the program include industrial catchment based approaches around urban waterways with water quality issues.

3.3. Program evaluation compared to 'best practice' design features

Table 2 provides a summary comparison of the New Zealand local voluntary programs aganist the 'best practice' design features. The five reviewed councils' programs all have a common element of protecting water quality. This is achieved through the provision of information and/or resources to industry to raise awareness of compliance requirements as stated in regional and district rules. Funding for all regional or district councils is derived from ratepayers, the provision for funding council led programs can vary as budgets can be changed to accommodate other areas that have greater environmental or public impact.

Adequate and consistent funding – the five council funded programs appear to have adequate levels and longevity of funding to remain operational, although GWRC has had instances where budgets were under spent. ARC's IP3 program is the only one to state it may recover costs if warranted by the magnitude of issues found during a site assessment. Council funding for all programs can be subject to change, when issues of regional significance arise there can be some precedence placed on these and if funds are required then some budget 'trimming' can occur.

Collaborative relationship with industry – most councils mentioned the development of sound relationships with industry or the business sector. The NSCC 'blitz' approach means that relationships are more informal and one-on-one rather than with a sector association or group. Northland RC is developing its industry relationships informally also, but endeavors to work with all known sites within a sector. The remaining councils' programs have been running longer allowing more time to approach and work with industry and supporting organizations, e.g., GRWC and ARC have Codes of Practice and/or guidelines in place for various sectors.

Single sector program focus – all council programs are generic in their design although ARC is instigating a change to a sector specific approach as stated in their LTCCP 2006–2016. The NRC program is semiformal and like NSCC is not supported by a documented generic guide, this approach allows the CP/PPO to tailor a program to each sector targeted. Greater Wellington RC and CRC have a generic management system guideline; staff implementing the program can provide information relevant to that site during or following a site visit. The NSCC model is broad and based solely on a catchment basis and all sites within that area are visited.

Setting credible targets – the three programs that have been running longest (ARC, GWRC & CRC) set completion targets and/or

Table 2
Evaluation of New Zealand Voluntary Programs against 'best practice' design features.

Design Features	Northland Regional Council	Auckland Regional Council	North Shore City Council	Greater Wellington Regional Council	Canterbury Regional Council
Adequate and consistent funding	Program developing, funding adequate	Adequately funded. Part funded by cost recovery from repeat participants or sites with significant pollution issues. Projected to remain for the next 8 years	Adequately funded	Fluctuated early on and funding under utilized some years. Projected to remain constant for next 8 years	Relatively consistent. Projected to remain for the next 8 years
Collaborative relationship with industry	Yes, developing and approach also includes the community	Yes, industry relationships developed, CoPs and guidelines developed collaboratively	Developing, utilize ARC information	Yes, liaison with industry sectors producing specific industry guidelines	Yes, increasing liaison with industry sectors, fact sheet development
Single sector program focus	No, generic approach at present	Under development, moving into sector focus from generic approach. EMP is an adaptable template for sites to use	No, pollution prevention focus, catchment blitz approach	Initially an industry specific approach taken, with a generic guideline	Generic program used to work with all known sites within an industry sector
Setting credible targets (for sites that are visited)	Empirical in nature currently, measured by CP/PPO during revisits	Yes, site has issues recorded and timelines for them to be achieved in	No, only one visit made with random rechecks occasionally	Yes, site has issues recorded and timelines for them to be achieved in	Yes, site has issues recorded and timelines for them to be achieved in
Info-regulation and resources available	Industry discussion group meetings, case studies under development	Yes, EOP and CoPs developed and industry guidelines and fact sheets	Some industry information sheets available also utilize ARC information	Industry information sheets available and guidelines	Fact sheets for some industry groups. Generic workshops held with 2 sectors
Threat of credible enforcement	Enforcement links, authority is an enforcement agency. PP approach with enforcement focus used	A firm-but-fair policy, enforcement under pins the program	Not perceived as strong on compliance or enforcement	Linked to enforcement, PCOs have powers of enforcement	Linked to enforcement, authority is an enforcement agency
Regular and credible monitoring	Monitoring does occur but the frequency is not mentioned. Progress is empirical through witnessed site changes	Sites are followed up on to ensure issues are resolved. Revisits can occur from reported incidents	No, only one visit made with random rechecks occasionally	Yes, sites with significant issues revisited to monitor progress	Yes, majority of sites revisited within two months and 2 site reports requested annually. Revisited after 2 years
Visible participant benefits	Only indirect through CP initiatives and reduced risk of fines	Indirect through reduced clean up and enforcement costs	Indirect through reduced risk of discharge and potential enforcement costs	Indirect through reduced liability, potential cost savings from CP initiatives. Certificate of participation being considered currently	Yes, potential for reduced monitoring costs for consented sites. Discounts on spill materials. Waste minimization incentives. Indirect through reduced risk of fines
Transparent provision of program results	Not recognised as a reported activity within council annual reports	Program not fully reported on in annual reports. Internal reports based on number of sites assessed and number of consents applied for	Sporadically reported in Annual Reports, some detail provided of the main projects and achievements	Annual plan sets the number of industry groups to be worked with, including the reduction of pollution incidents compared to baseline target, Annual Pollution Control Reports summarize actual work undertaken	Yes, actual sites visited versus proposed. Resolution of issues not reported on, generally only major report targets are monitored in brief

dates for resolving issues on industrial or business sites according to risk posed in agreement with site personnel. Neither the NRC or NSCC program mentions the setting of targets for a site to achieve objectives or resolve issues. The NRC program revisits sites that require further assistance to resolve issues, while NSCC randomly revisits sites to see if they have implemented changes to site practices.

Info-regulation and resources available – all the programs have resources or information available for participants, although the depth of information and number of resources available varies greatly. Auckland RC and GWRC have developed CoPs and/or guidelines with industry; CRC, NRC and NSCC are developing their resources as their programs evolve and develop with further industry sectors. As a territorial authority within the Auckland region NSCC utilizes the resources and guidelines developed by ARC.

Threat of credible enforcement – all councils have some level of enforcement within their structures, the only variance is in the credibility and threat of council enforcement operations. Greater Wellington RC staff have powers of enforcement, so when the voluntary approach does not work, enforcement can be carried out by the same staff member. A firm-but-fair approach is undertaken by ARC, giving the participants time to implement change and resolve issues, a similar approach was reported in both NRC and CRC programs. The 'blitz' program review carried out by NSCC, highlighted that enforcement was not perceived as strong or consistent among the business or industrial sectors, NSCC has its own enforcement capability and can also call on the ARC at a higher level.

Regular and credible monitoring – most programs followed up on program participants, however regularity varies between councils, with random revisits by NSCC, to programmed revisits and planned follow-up mechanisms for ensuring issues are resolved by CRC. The significance of the environmental issues found by ARC and GWRC were the key motivators for monitoring a site's progress. Sites that require and hold consents within ARC's program are monitored repeatedly under regulation to ensure conditions are maintained. NRC provided further staff assistance and monitoring to sites that were changing practices and reducing their environmental liability.

Visible participant benefits – most had indirect benefits relating to the reduced potential for fines or enforcement action. Most programs allow some leniency for a site to resolve an environmental issue. Production or process efficiencies through CP initiatives are available from the NRC, GWRC and CRC programs. There is the potential for reduced compliance costs for consented sites in the CRC program, along with subsidies for purchasing spill management materials. Promoting competitive advantage is planned in differing forms from GWRC with the certification of participants and the advertising of businesses completing the NSCC and CRC programs.

Transparent provision of program results – only three of the programs report publicly. In part this is due to the vast council program structures and number of reportable objectives. Generally only the main outcomes that the council perceives as a priority are reported on. The NSCC program has some reporting provided but not consistently or of any true indication of what is being undertaken or achieved. The CRC program only focuses on the number of sites visited, with the first year providing some detail on the issues found and resolved. GWRC produce an annual report on incidents and prosecutions in the Wellington area, within this a detailed review is provided on what the 'Take Charge' program has achieved. As the GWRC program becomes further established the reports have developed to provide more detail and program information.

4. Conclusions

The wealth of global research literature on voluntary approaches to pollution prevention programs shows they have merit, but they need certain design features and implementation structures to be successful (Chittock and Hughey, 2011). The objective of this research was to compare five New Zealand regional and local authorities' pollution prevention programs to the best practice design standard. Analysis shows they all have varying degrees of 'best practice' design features in place.

Auckland RC's program was the only one that may recover costs. United States research shows that this approach created a 'barrier' for industry and reduced the uptake of the program (Funk, 2002). Funding is one area that all council led programs can have difficulties with, having proposed funding for expansion or implementation of industry work declined can occur and is beyond the control of program personnel.

All councils to varying degrees had or are developing collaborative relationships with industry groups. This needs to be continued by all, especially the newer programs, to help them get established. Industry in the United States ranked collaboration with regulatory agencies as the main reason for participating in voluntary programs (United States Environmental Protection Agency, 2005).

None of New Zealand's programs are industry specific; a generic approach has been taken by all. There is flexibility and adaptation available in the local programs through the use of Codes of Practice(s), guidelines and fact sheets. ARC has started to move into sector specific programs (Auckland Regional Council, 1999). Australian research found that the best way to maximize results for voluntary programs is to include appropriate industry initiatives and design features (Gunningham and Sinclair, 2002). Canada used a template from the motor industry to develop a new program for the metal finishing and print and graphics groups, and the United States had industry established programs that collaborated with the EPA (United States Environmental Protection Agency, 2007).

Most New Zealand programs appear to set credible targets – this is a vital area all councils need to manage carefully to equitably monitor the progress of participating sites. The more recent programs need to develop this area to improve monitoring and reporting of sites, thus helping to maintain the credibility of the pollution prevention programs. All the reviewed countries did this to some degree but with no consistent process established. These conclusions are consistent with Peters and Turner (2004) who showed that the establishment of baseline data allowed accurate assessment and measurement of any site improvements made.

All councils have some form of resource or information they can supply a site with, although the newer council programs need further initiatives in this area. The NSCC focus group highlighted this in the findings – industry gets bombarded with information from councils, and they are only interested in what is directly relevant to them and the implications for their business (Rabe, 1999).

All councils have enforcement options available, although the findings of the NSCC focus groups found that industry representatives perceive council regulation and enforcement practices as weak and inconsistent. We perceive that this may not be an opinion isolated to this council, but more research is required to test this perception. Despite this view it is also clear that 'a hard line' should not be taken with every case, a period of leniency was offered by most councils and appears a good enticement and transition for businesses to join programs. Research from Oregon reinforces this view – enforcement dispensation was provided as long as program participants corrected problems that arose and subsequently

maintained an overall high level of environmental performance (Funk, 2002).

Program monitoring varies greatly in New Zealand. There is no universal set of indicators thus making comparative reporting and assessment, even within council, very challenging if not impossible. The credibility of all programs' monitoring is thus an area that all councils need to address, perhaps supported by the relevant central government agencies. This not only distorts reports on the programs' achievements, but also has the potential to damage the industry relationships that have been established. Research from both Japan (Sugiyama and Imura, 1999) and Canada (OECD, 2003) reinforced this conclusion.

All five New Zealand pollution prevention programs reported some participant benefit, the majority via indirect measures, such as lower potential for a fineable offence to occur, or clean up cost. However, Northland's CP component can provide a participant with process or operational savings, but this is not always possible with some industry groups (auto dismantlers and scrap dealers). Greater Wellington RC is investigating a 'green' certificate system and Canterbury RC have discounts available for spill kit purchases and reduced monitoring costs for consented sites. The New South Wales VEA provides industry with reduced insurance costs - this is an area that all council programs could explore further to provide further enticement for industry to participate (Pollution Control Consultancy and Design).

Greater Wellington RC provides the highest level of program results of all councils, producing a separate 'Pollution Control Annual Report' where the 'Take Charge' initiatives created, or catchments and sites worked with, are publicly recorded. Openly reporting program initiatives helps provide transparency. Research from Japan found that reports of industry agreements are sometimes kept confidential, as some agreements' effectiveness were questioned due to inadequate monitoring by authorities and infrequent submissions of emission reports by industry as agreed upon (Sugiyama and Imura, 1999). The credibility of New Zealand's pollution prevention programs need to be maintained as all are publicly funded and reporting transparency must be emphasized.

All five councils' pollution prevention programs contained some of the best practice design features in their program's design. The older programs from ARC and GWRC rank highest out of the five. Auckland RC is the only council to specifically include the use of an Industrial and Trade Pollution Program to meet policy requirements as well as looking to implement a specific industry focused program. However, all programs have the potential to develop towards containing all of the 'best practice' design features, with most emphasis needed on the credibility of program monitoring. From an ongoing research perspective, and also from an overall PP program performance point of view, the biggest challenge remains the extent and depth that the programs apply each of the design features. As presented here, and in their earliest form in Borkey et al. (1999), they are extremely generic. While generic design features provide for flexibility in implementation, often seen as a positive, they can also be a recipe for 'tokenism', something that future researchers and program managers need to be aware of.

We also sought to determine if these programs were contributing to sustainable management in New Zealand. Findings in this respect were equivocal. This finding in part is due to the lack of specificity around targets, monitoring and reporting, items already identified as needing further attention.

Overall then this research has highlighted that to date the small size of New Zealand and the high level of interaction between council personnel has seen programs develop largely in unison. This may not always be the case with future pollution prevention programs implemented by other councils. Based on this research the following recommendations should be focused on:

- A national framework for local council authorities to design voluntary environmental programs, including pollution prevention programs should be implemented. This ideally should be guided by input from the five councils currently implementing these programs.
- Inclusion of the 'best practice' design framework within regional and district policy documents but with improved specificity around some of the design features, particularly in terms of target setting, monitoring and reporting.

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